Report of the

Governor's Energy Policy Council

presented to

Governor Bob Holden

Missouri
Department of
Natural Resources

June 1, 2003

Table of Contents

Governor's Energy Policy Council

Vision Statement

Missouri energy policy shall ensure an adequate, diverse and reliable energy supply, produced and used in an efficient and environmentally sound manner, that is accessible, equitable and affordable to all Missourians.

Preamble

The Governor's Energy Policy Council shall serve in an advisory capacity to the Governor on matters of local, state, regional and national energy policy. The Council will serve as a public forum, sounding board and think tank on energy policy. The Council believes that the fundamental components of Missouri's energy policy include energy efficiency, conservation, self-sufficiency and diversity to benefit Missouri's energy security, environment and economy.

Executive Summary

Governor Holden established the Missouri Energy Policy Council by Executive Order 03-10 to serve in an advisory capacity on matters of local, state, regional and national energy policy. The Council will consider and make recommendations on several issues, including the following:

- Major aspects of energy policy, energy supplies and energy prices;
- Consumer protections, including consumer education, universal access, low-income assistance funding and the impact of regulatory changes;
- New energy technologies and trends;
- Opportunities to increase energy efficiency, and;
- Opportunities to increase the use of diverse and clean energy supplies to improve the economic vitality and environmental quality of Missouri residences, businesses, farms and transportation.

The executive order directed the Council to prepare a report by June 1 that describes Missouri's current and future energy supplies and demand, recommends how Missouri state government may demonstrate its leadership in energy efficiency, and analyzes the impact of the Standard Market Design rules recently proposed by the Federal Energy Regulatory Commission.

Missouri's Energy Use and Sources

Missouri depends heavily on energy resources from outside the state, importing more than 95 percent of its energy sources in the form of coal, petroleum and natural gas at a cost of $13.2 billion in 2000. Missouri lacks oil and natural gas resources. The state has only modest coal resources, which are difficult to use to fuel electrical generating plants because of air quality issues associated with the coal's high sulfur content. To continue the consumption of fossil fuels into the 21st century at current rates of increase, Missouri would have to more than triple its imports of fossil fuels by mid-century. Energy efficiency and the development and use of Missouri's renewable energy resources offer economic benefits to Missouri and should be fundamental components of how we meet our energy needs.

Missouri State Government as a Leader in Energy Efficiency

Missouri state agencies, including universities, spend about $78 million for energy use in state facilities. Energy efficiency saves taxpayer dollars that can be used to fund essential public services. If the state's energy bill were reduced just 10 percent, a very conservative estimate, savings to the state would be $7.8 million annually over the life of the efficiency measure. These dollar savings can play a valuable role in funding public services under the current budget situation.

For example, in January of this year, the Office of Administration implemented a number of simple, no-cost energy efficiency changes in 26 state buildings. As a result, the state has saved more than $100,000 in energy costs and reduced energy use by more than one million-kilowatt hours in five months. As a result of upgrades to lighting and heating and air conditioning equipment, the Department of Natural Resources is saving $55,000 annually in energy costs on one building alone. These improvements will pay for themselves in 11 years.

State government should be a model of energy efficiency and demonstrate its leadership through the efficient design and management of its facilities and fleets. Initial recommendations from the Council to increase energy efficiency in state facilities include use of performance contracting to finance improvements to state-owned buildings, demonstrations of model facilities, training staff in energy-efficient operations strategies and training architects and engineers in state building efficiency standards. State fleet efficiency recommendations include procurement of efficient vehicles, effective vehicle maintenance procedures, fleet management and telecommuting. The Council will evaluate additional recommendations in its future work.

Standard Market Design

The Federal Energy Regulatory Commission's (FERC) Notice of Proposed Rulemaking for Standard Market Design was issued on July 31, 2002, with the stated purposes of better ensuring competition in wholesale electricity markets and open access to transmission lines. In response to strident concerns among states, especially southern and western states, FERC issued a white paper April 28, 2003, to moderate and further explain aspects of its standard market design proposed changes. Because this proposed rule is subject to further change, this matter requires ongoing study and analysis. The Council believes FERC should take ample time to evaluate the proposed changes in wholesale market operation. The Council also recommends that Missouri take the position that Missouri citizens should not be adversely affected through higher electricity rates and/or reduced services.

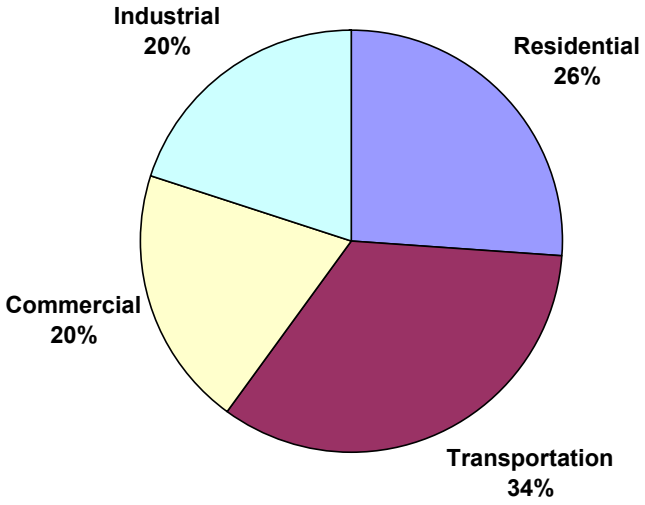
[1]An Overview of Missouri Energy Use and Sources

In calendar year 2000, the state of Missouri ranked as the 22nd largest energy consuming state overall at 1.7 quadrillion British thermal units (Btu) and the 38th largest energy consuming state per capita at 296 million Btus. Missouri ranked 17th in the nation in energy expenditures, spending about $13.2 billion in 2000 to meet its energy needs.

- **Missouri was ranked as the 22nd largest energy consuming state in the U.S. using a total of 1.7 quadrillion Btu of energy.**
- **Missouri was ranked 17th in the U.S. in total energy expenditures at $13.2 billion.**

Missouri's population has grown by about 8 percent in the past ten years (1991 – 2000) while energy demand has increased by nearly 11 percent. Missouri ranked in the top 20 states in all energy-using sectors except the industrial sector. Missouri consumption ranked 15th in the nation for residential, 13th in commercial, 31st in industrial and 17th in transportation. Missouri's major energy-consuming sectors and their share of total energy consumed is displayed below.

Missouri Energy Use by Sector



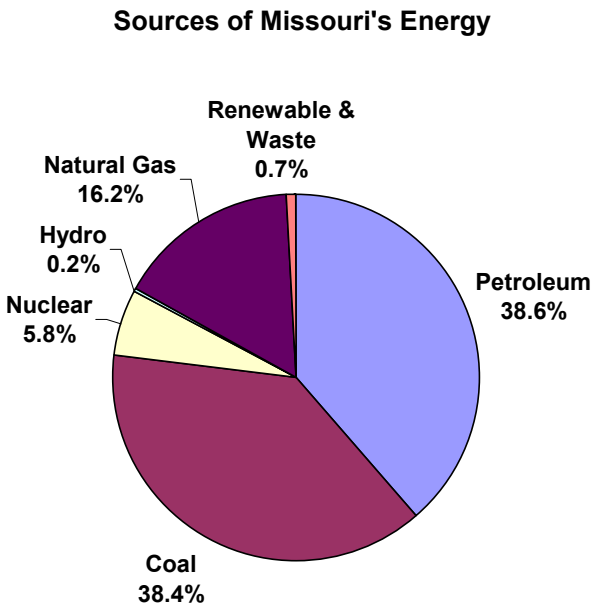
Missouri depends heavily on energy resources from outside the state, importing more than 95 percent of its energy sources in the form of coal, petroleum and natural gas. In 2000, Missourians paid $13.2 billion for energy, as compared to $11.3 billion in 1999, an increase of about 17 percent (in nominal dollars).

The majority of energy that Missourians consume is fossil fuels – coal, petroleum and natural gas. Of all energy consumed in Missouri in 2000, about 93 percent came from fossil fuels. From 1990 to 2000, expenditures for fossil fuels increased about 46 percent, from $6.6 billion to $9.7 billion. Missouri lacks oil and natural gas resources. The state has only modest coal resources, which are difficult to use to fuel electrical generating plants because of air quality issues associated with the coal's high sulfur content.

[1] The most current available data from the U.S. Department of Energy for calendar year 2000 is used throughout this report unless otherwise noted.

The pie chart at right shows a breakdown of Missouri consumers' use of primary energy sources in 2000 including coal, petroleum, natural gas, nuclear, hydroelectric, renewable and waste resources. From 1990 to 2000, coal use increased at an average annual growth rate of 2.5 percent, followed by natural gas at 1.8 percent and petroleum at 1.2 percent.

To continue the consumption of fossil fuels into the 21st century at these same rates of increase, Missouri would have to more than triple fossil fuel imports by mid-century.



The world's present supplies of coal, oil and natural gas are finite and non-renewable. Missourians have choices to make to ensure adequate future energy supplies. Choices include commitment to energy-efficiency programs that moderate energy demand and development of Missouri-based energy resources, both renewable and non-renewable resources with due consideration to the effect on environmental quality, public health and energy prices.

A Comparison of Missouri and U.S. Energy Prices and Expenditures by Source
(Millions of Dollars)

Energy Source	MO $/MMBtu	U.S. Ranking	U.S. $/MMBtu	MO Total Expenditure (2)	U.S. Ranking	U.S. Avg. Expenditure
Electricity	$17.63	29	$20.04	$4,370	19	$4,500
Petroleum(1)	$10.33	27	$ 9.94	$7,142	17	$7,100
Natural Gas	$ 6.63	12	$ 6.63	$1,870	17	$1,900
Coal	$ 0.93	47	$ 1.27	$ 644	15	$ 563

(1) Includes distillate fuels, jet fuel, LPG, motor gasoline, residual fuel, asphalt, road oil, aviation gasoline, kerosene, lubricants, and petroleum coke.

(2) The four items in the "Missouri Expenditures" column add up to more than $13.2 billion because expenditures for coal, natural gas and petroleum used to generate electricity are included in the "electricity" item and also in the "coal," "natural gas" and "petroleum" items. In 2000, Missouri utilities expended $808 million for primary fuels including $609 million for coal, $135 million for natural gas, $22 million for oil and $42 million for nuclear fuel.

Electricity

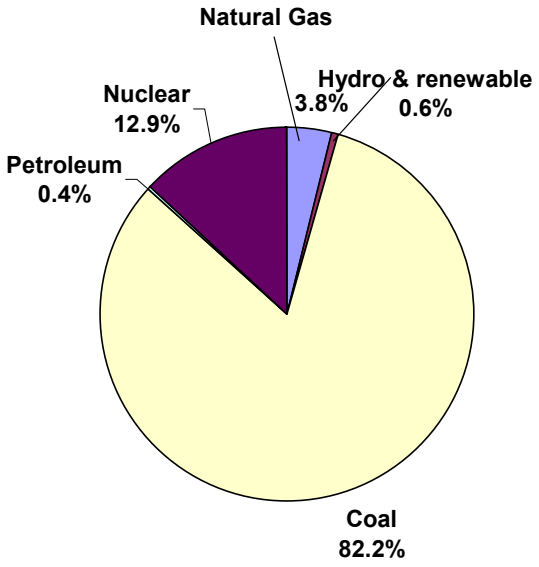
Missouri's electricity is produced predominantly by coal (82 percent) and nuclear power (13 percent). About four percent comes from natural gas. The remaining one percent comes from hydroelectric power, wood, fuel oil and other minor sources. Missouri spent $644 million to purchase coal in 2000.

- **Missouri consumed 72.6 billion Kilowatthours of electricity and was ranked 19th in the U.S.**
- **Electricity expenditures totaled $4.4 billion ranking 19th in the U.S.**
- **Missouri ranks 26th in its average utility retail price at 6.07 cents per kilowatt hour**

Generating facilities within Missouri provide the great majority of the state's electrical power. These utilities include investor-owned regulated electric utilities, municipal electric utilities and rural electric cooperatives. Missouri also receives some electricity from outside the state and exports some power from Missouri to other states. For more than two decades, Missouri has enjoyed abundant electricity and is a net exporter. Missouri electric consumption in 2000 for all energy end-use sectors totaled 72,643 million-kilowatt hours (kWh). Total Missouri utility and non-utility generation was 76,626 million kWh. Excluding out-of-state contracts for interstate transport into Missouri, the base difference between domestic generation and consumption was 3,643 million kWh.

The Missouri Public Service Commission (PSC) regulates Missouri's five electric investor-owned utilities.[2] The PSC works closely with these utilities to monitor current situations, provide direction if capacity or reliability concerns arise and set appropriate customer rates. The five regulated investor-owned utilities in Missouri are AmerenUE (St. Louis), Kansas City Power and Light, Light and Power (St. Joseph, a division of Aquila, formerly known as St. Joseph Light and Power Company), The Empire District Electric Company (Joplin) and Missouri Public Service (Kansas City, also a division of Aquila). These five utilities comprise approximately 70 percent of electricity sales to Missouri customers.

Missouri Electric Generation Sources



Rural electric cooperatives have 16 percent of the market share while municipal utilities have 12 percent. The municipal utility in Missouri's third largest city, Springfield, accounts for approximately 30 percent of the municipal utility sales in the state.

[2] Currently the PSC also regulates Citizens Electric Cooperative; however if the Governor signs SB 255 that was passed by the General Assembly in April 2003, Citizens Electric Cooperative will no longer be a regulated utility.

Missouri ranks as the nation's 20th largest consumer of electricity per capita. In 2000, Missourians spent about $4.4 billion for electricity. Missouri's average utility retail electricity price ranks 26th at 6.07 cents per kWh.

The U.S. Department of Energy projects that United States electricity demand will grow by 1.8 to 1.9 percent per year through 2025 due to growth in electricity use for computers, office equipment, and a variety of electrical appliances in the residential and commercial sectors.

Projected peak electricity demand and supply for Missouri is analyzed here based on the aggregate four-year projected peak demand and capacity for nine of the largest electric utilities in the state. These include the five investor-owned utilities; Associated Electric Cooperative Inc. (AECI), the primary source of power for 51 electric distribution cooperatives; and the state's three largest municipal electric utilities (Springfield City Utilities, Independence Power and Light and Columbia Water and Light).[3] (See Appendix A)

At present, the combined capacity of these nine utilities exceeds their combined required capacity (which includes a required reserve margin) by about four percent, a surplus of about 970 megawatts (MW).[4] However 2006 project capacity requirements for these utilities projected to exceed combined projected capacity by about 4 percent, a deficit of about 1,200 MW. However, in the normal course of business, investor-owned utilities work with the PSC to plan for future energy needs. Therefore, the projected 2006 capacity shortfall is not expected to be a critical issue because plans have begun to ensure sufficient generation.

A shortfall in peak capacity could be addressed through a variety of solutions: building or contracting for additional conventional generating capacity, moderating the growth in peak demand through energy-efficiency programs or load-management services, providing additional energy through renewable and distributed energy resources or a combination of all three. In addition, as a result of overbuilding of capacity by unregulated wholesale generators in the Midwest, there may currently be excess capacity available on the wholesale market at reasonable terms. The ability to move this electricity to Missouri assumes adequate transmission capacity exists to transport the power to Missouri consumers when and where it is needed. Federal and state experts recognize current limitations in transmission lines and related facilities periodically hamper the ability to transport power where it is needed. Refer to the Standard Market Design section of this report as it relates to federal efforts to address transmission needs.

[3] Data for AECI and the three municipal utilities was provided by the individual utilities; the Public Service Commission provided data for the investor-owned utilities.

[4] The capacity requirement includes a 12 to 16 percent reserve margin above the utilities' forecasted peak demands, determined by the power pool to which the utility belongs.

The majority of the forecasted need for additional capacity by 2006 focuses on meeting peak demand for the relatively few summer hours of the year when demand is greatest. Peaking plants provide additional short-term power to satisfy the additional load that occurs during peak periods. Peaking plants have relatively low up-front capital costs but high fuel costs. These peaking plants are typically natural gas fired combustion turbines that can be built in approximately eighteen months. Energy-efficiency efforts and load-management programs provide alternative or supplementary approaches to reducing peak demand.

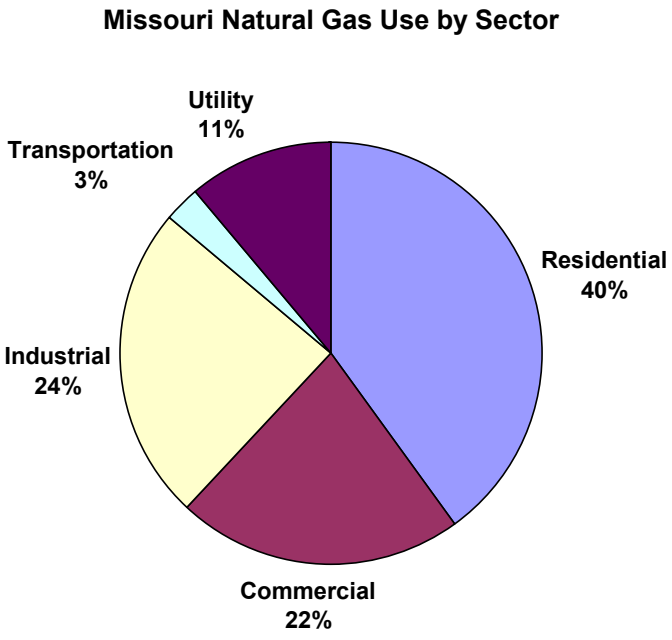
Residential customers account for more than 40 percent of Missouri's electricity consumption, followed by commercial users at 37 percent, industrial at nearly 22 percent and the remaining balance for streetlights and other applications at 1 percent.

Natural Gas

Approximately 60 percent of Missouri households use natural gas to heat their homes. Natural gas also is used to produce goods and generate electricity. During 2000, Missourians spent about $1.9 billion and used approximately 285 billion cubic feet of natural gas.

A combination of several factors has contributed to higher natural gas prices. During the past decade, drilling rates were low because of low market prices. These decreased supplies of natural gas set the stage for price and supply volatility. In recent years, unusually cold winters placed additional demand on natural gas supplies, resulting in higher prices. When prices remained higher than the $2.00 per million Btu from previous years, less gas was purchased to place into storage.

Wholesale natural gas prices spiked 287 percent higher during the winter of 2002-2003 than during the winter of 2001-2002, moving from $2.36 to $9.13 per million Btu (*Missouri Energy Bulletin*, March 26, 2003). Similar spikes also accompanied the winter of 2000-2001. While well below the winter peaks now in spring 2003, the natural gas spot price has remained high in historical terms for this time of year. As of May 9, 2003, working gas in storage stood about 47 percent below 2002 levels at this time and 38 percent below the previous five-year average. The lower natural gas stockpiles indicate a continuation of prices higher than historical levels.



Electric utilities are now using more natural gas to produce electricity. This new demand for natural gas places additional pressure on natural gas supplies and prices. Missouri's electric utilities used about 7 billion cubic feet of natural gas in 1997, 16 billion in 1998, 19 billion in 1999 and 30 billion in 2000 – an annual average increase of 23 percent.

The U.S. Department of Energy expects total U.S. demand for natural gas to increase at an average annual rate of 1.8 percent through 2025, primarily because of rapid growth in demand for electricity generation.

Natural gas is transported into Missouri by interstate pipeline from Arkansas, Oklahoma and Kansas to local distribution companies (gas utility companies) that, in turn, move the product to the consumer through local gas lines. Missouri is not a natural gas producing state having no commercial gas production and little potential for future production.

- **Missouri consumed 285 billion cubic feet of natural gas and rranked 23rd in the U.S.**
- **Natural gas expenditures totaled $1.9 billion and ranked 17th in the U.S.**

Propane

Propane is a byproduct of both crude oil refining and natural gas production. The U.S. Census Report for 2000 reveals that approximately 12 percent of Missouri households heat with propane. Propane also is used to support commercial operations, produce goods, dry grain harvests and fuel vehicles.

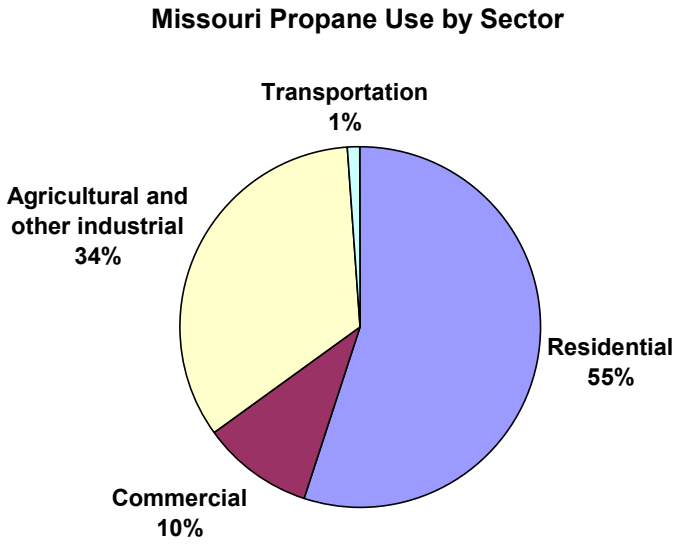
In 2000, Missourians spent about $459 million and used approximately 455 million gallons of propane. The residential sector consumed the largest share at nearly 55 percent, followed by industry (which includes agriculture) at approximately 34 percent. The commercial sector used 10 percent while the transportation sector consumed the smallest share at one percent.

- **Missouri consumed 455 million gallons of propane**
- **Propane expenditures totaled $459 million**

Total propane expenditures in Missouri have increased by an annual average rate of more than 30 percent from 1998 through 2000, moving from $238.3 million to $459 million. Similar factors to those affecting natural gas – low inventories, cold winter and high fossil fuel prices – have contributed to higher propane prices and lower propane supply availability. During this same period, the average price of propane increased by nearly 45 percent.

Total propane sales volumes reported by Missouri retail companies totaled 592 million gallons in 2001, representing 5.2 percent of national sales.[5] This is a 28 percent increase from 2000 sales of approximately 462 million gallons that represented 3.8 percent of U.S. sales. The majority of sales (83 percent) in 2001 were to residential and commercial end users.

Propane is moved by pipeline and truck. Pipelines move propane to distribution terminals in Missouri located at Kearney, Moberly, Jefferson City, Belle, Mt. Vernon, and Dexter. From these points, large transport trucks move propane to retailers. Local propane retailers then supply propane to Missouri end-use customers using smaller delivery trucks. About 230 propane retail outlets with approximately 657 local storage locations serve Missouri customers. Ferrellgas Company, located at Liberty, is the second largest propane company in the U.S.



Petroleum

Consumption of petroleum-based products – about 15 million gallons per day – accounts for approximately 38.6 percent of all primary energy consumed in Missouri. Missourians spent about $7.1 billion on petroleum products in 2000.

- **Missouri consumed 130 million barrels of petroleum, ranked 18th in the U.S.**
- **Petroleum expenditures totaled $7.1 billion, ranked 17th in the U.S.**

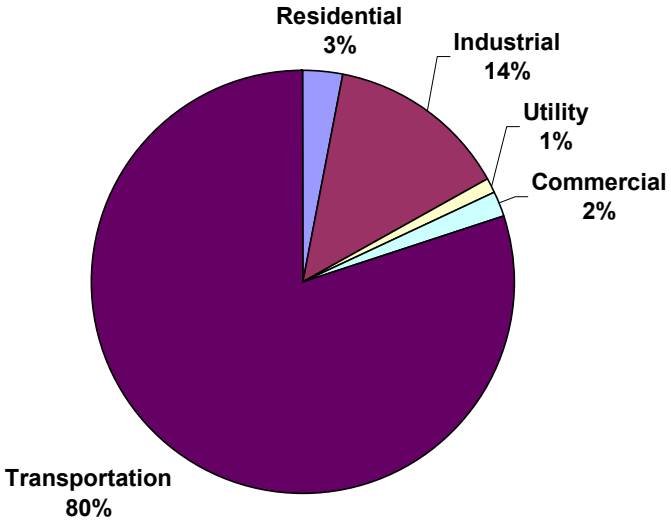
Motor gasoline, motor distillate fuel, kerosene/distillate and jet fuel accounted for over 85 percent of the total petroleum consumption. Nearly 80 percent of petroleum consumed in the state is for transportation use at a cost of about $6.6 billion in 2000.

Missouri consumes about 8.5 million gallons of gasoline each day – expenditures for gasoline totaled $4.4 billion in 2000. As a nation, and Missouri is no exception, Americans are driving less fuel-efficient vehicles. The number of miles Missourians drive per capita continues to increase. These two factors combine to increase Missouri's gasoline use by two percent annually.

[5] "2001 Sales of Natural Gas Liquids and Liquefied Refinery Gases," American Petroleum Institute, November 2002. This report presents results of a survey reporting estimated sales - not consumption.

The majority of petroleum products enter Missouri through pipelines, barges and large tanker trucks running from Texas, Louisiana, Arkansas, Oklahoma, Kansas and Illinois.

Missouri Petroleum Use by Sector



Energy Efficiency

Energy use plays an integral role in Missouri's ability to improve economic prosperity and greatly influences the quality of the environment. Using energy more efficiently helps the economy grow and reduces the environmental impacts on our air and water by displacing fossil fuel generation. Because Missouri imports more than 95 percent of its primary energy sources at a cost of $13.2 billion in 2000, actions that reduce the rate at which dollars leave our state for the purchase of fossil fuels benefit our economy.

Energy-efficiency measures reduce demand and essentially serve as an energy resource like coal, wind, biomass, oil, solar or natural gas. While additional energy supplies will be needed to meet increasing demand, energy efficiency also provides a means to moderate demand and reduce the number of new power plants needed and development of other energy sources. In contrast to supply options for new generation such as drilling for more natural gas or mining coal, energy efficiency helps contain energy prices by curbing demand instead of increasing supply. This means that energy efficiency provides additional environmental and economic value by preserving natural resources and reducing emissions. [6] Energy efficiency also can help reduce the vulnerability of our economy to energy supply disruptions.

Several reports show that Missouri stands to gain jobs and economic benefits from investing in energy efficiency and renewable energy development. The *Missouri Statewide Energy Study*, published in 1992, identified nearly 100 energy-efficiency measures with paybacks of five years or less and expected net jobs and income benefits from these measures. The study also estimated these parameters for dozens more measures with longer paybacks. The energy study "generally supports the wisdom in investment in energy efficiency from either the demand or supply side" and that "investments in energy efficiency represent a significant economic development opportunity for the state." [7]

In 1993, the Department of Natural Resources' Environmental Improvement and Energy Resources Authority (EIERA) completed a study in response to a request from the Missouri General Assembly pursuant to House Concurrent Resolution (HCR) 16. This study estimated Missouri environmental and macroeconomic benefits to be achieved from implementing three levels of energy standards for new residential and commercial buildings.[8] These levels were (1) the Model Energy Code (MEC) and ASHRAE[9]

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[6] Source: "Utility Deregulation a Bust for Energy Efficiency Programs," Environmental Working Group, October 1998.

[7] "Missouri Statewide Energy Study," Department of Natural Resources Environmental Improvement and Energy Resources Authority, 1992 (Volume I, Chapter V, pg. I-33).

[8] "Report to the Missouri Legislature Pursuant to House Concurrent Resolution 16: Economic Opportunities through Energy Efficiency, and The Energy Policy Act of 1992," Department of Natural Resources' Environmental Improvement and Energy Resources Authority (EIERA), December 1993.

[9] ASHRAE, the American Society of Heating, Refrigerating and Air-Conditioning Engineers, is an international organization that advances the arts and sciences of heating, ventilation, air conditioning and refrigeration through research, standards writing, continuing education and publications. Through its membership, ASHRAE writes standards that set uniform methods of testing and rating equipment and establish accepted practices for the heating, ventilation and air-conditioning industry worldwide, such as the design of energy efficient buildings. Council of

standards, (2) a higher standard based on recommendations by utilities and builders associated with energy-efficiency efforts in the state and (3) a more aggressive level of efficiency improvements. Estimates of benefits for the three levels were based on detailed examination of prevailing and available energy technologies for specific end uses in a number of building types. The study concluded that implementation of standards at any of the three levels would provide a net macroeconomic benefit compared to the baseline case of no energy standards. The estimated net benefits for the three levels of implementation were $101 million from implementing the MEC / ASHRAE standards, $550 million from implementing the next level of standards and $489 million for the highest standard (1993 dollars).

Both the *Energy Study* and the HCR 16 report projected significant macroeconomic benefits from adopting statewide energy codes. The *Energy Study* estimated that every $1 million spent complying with the ASHRAE 90.1 energy code would create about a half million dollars in net income, about 27 net jobs and have a simple payback of about four years. Every $1 million spent complying with the CABO residential code would create about $320,000 in net revenue, 16 net jobs and have a simple payback of about six years.[10]

Assessments of energy savings potential at dozens of individual Missouri industrial facilities, available from the University of Missouri-Rolla's Industrial Assessment Center, indicate that substantial economic benefit is available from energy efficiency in Missouri's industrial sector. A national study conducted in 1998 by the Energy Cost Savings Council (ECSC) and Energy User News reviewed more than 1,000 commercial and industrial building energy-efficiency upgrades such as lighting, motors, drives, building automation systems and HVAC. The study concluded that companies can save up to $1.00 per square foot in annual operations cost and obtain a 30 to 50 percent return on investment within two to three years of initial investment.

The 1998 study, *Opportunities Lost* conducted by the Alliance to Save Energy, compares the impact of implementing a residential energy code based on the MEC '93 standard in 34 states.[11] The study ranked Missouri fifth in potential for annual statewide energy savings and estimated that within 1.5 years the monthly savings per Missouri home would exceed the monthly increase in mortgage payments from implementing measures. This study shows that modern building energy codes save consumers money and energy every year, making housing more affordable over the life of the home while reducing air pollution.

Efficiency improvements that offer most potential for energy savings include efficient residential heating, ventilating and air conditioning equipment (HVAC); tune-ups and repair of HVAC equipment; proper installation, maintenance and use of commercial

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[10] CABO, the American Building Officials, is one of several building code organizations that comprise the International Code Council (ICC) and is responsible for establishing uniform building, electric and plumbing codes and standards.

[11] "Opportunity Lost: Better Energy Codes for Affordable Housing and a Cleaner Environment," Alliance to Save Energy, 1998.

HVAC and other building systems; and energy-efficient commercial and industrial sector lighting retrofits, motors, steam and compressed air systems.

Effective energy-efficiency programs address the barriers that inhibit customers from making investments in energy efficiency improvements – lack of money or competing demands for available funds, up-front costs that are perceived to be more real than long-term savings, lack of information or technical expertise, and lack of available technology.

Energy-efficiency programs can include low-income weatherization; low-cost customer financing for energy-efficient building improvements and appliances; information; new-home construction practices; reduced air infiltration; and incentives for energy-efficient heating systems, geothermal heat pumps, domestic water heating, lighting and windows. Efficiency programs in other states are funded through a utility company's investment of a percent of its revenues, customer charges, and tax incentives.

To achieve public benefits for Missouri citizens, financial incentives and ongoing funding such as a public benefits fund, are needed to encourage investments in energy efficiency. One effort to realize some of these energy savings for Missouri citizens is AmerenUE's recent agreement to provide $4 million in funding over a four-year period for residential and commercial energy-efficiency programs. As the result of a negotiated settlement in an over-earnings rate case, these programs will be developed in a collaborative process with the Department of Natural Resources, the Public Service Commission, Office of Public Counsel and AmerenUE.

Renewable Energy Sources

Renewable energy sources in the Midwest are playing an increasing role in providing energy needs. Diversifying energy sources in Missouri will provide numerous benefits by:

- reducing our vulnerability to volatile oil markets,
- improving grid reliability through on-site generation,
- increasing the competitiveness and reliability of businesses and energy systems,
- offering economic benefits from the development of renewable energy industries and keeping more of our energy dollars in the local economy, and
- improving the environment from reduced emissions that harm public health.

Clean domestic energy choices for power generation, including solar, wind and biomass, can improve efficiencies and reduce expenditures on transmission and distribution equipment by siting these technologies close to the point of consumption, where possible.

Other Midwest states have begun to realize the economic benefits from the development of renewable energy industries. Many of these economic benefits accrue, in particular, to the rural economy. In Iowa and Minnesota for example, wind-farm

developers pay 115 farmers about $2,000 per year for each wind turbine placed on the farmer's property, for a statewide total of approximately $640,000 per year. The Iowa wind projects also generate $2 million per year in tax revenue to counties and have created 40 new jobs. An economic study by the Regional Economics Applications Laboratory estimates that the state of Illinois can add 13,500 new jobs and $1.5 billion in annual economic output by 2020 by investing in renewable energy technologies.[12] The study includes estimates for nine other states in the Midwest.

The Union of Concerned Scientists (UCS) studied the impact of a national policy called a renewable portfolio standard (RPS) to increase the United States' use of renewable energy to 20 percent by 2020.[13] The UCS analysis found that under a 20 percent RPS, Missouri could produce the equivalent of 3 percent of its electricity use from renewable energy (not including hydropower) in 2010 and 23 percent in 2020 from bioenergy resources (88%), wind (7%) and landfill gas (5%). If a RPS were in place, the study estimates that, between 2002 and 2020, renewable energy development could generate $1.6 billion in new capital investment in Missouri; $62 million in new property tax revenues for local communities; and $4 million in lease payments to farmers, ranchers and rural landowners from wind power (1999 dollars).

Missouri has adopted limited policies to develop and use renewable energy. These policies relate to transportation renewable fuels – ethanol and biodiesel -- and include tax incentives and subsidies for production. At this time, Missouri has no incentive policies that have resulted in additional use of renewable energy sources to generate electricity.

In a survey of 175 Missouri utilities conducted by the Energy Center in 2002, only 3 percent indicated plans to offer a renewable or alternative energy program or service. In a newly released study from the Union of Concerned Scientists, Missouri received a grade of "F" and is one of six states listed in the "Hall of Shame" for a lack of commitment to renewable electricity.[14] Thirty-four states received failing grades of D or F for their lack of commitment to renewable electricity. This report assigns grades to each of the 50 states based on their commitment to supporting wind, solar, and other renewable energy sources. Commitment is measured by the projected results of renewable electricity standards for electric companies and dedicated renewable electricity funds. Current state renewable energy generation is also considered.

The cost of wind energy is now in a competitive range with power technologies that use fossil fuels, ranging from 4.0 to 6.0 cents per kilowatt hour, not including the U.S. federal production tax credit.[15] Increasingly, utility companies are deciding to build wind-powered generation because it is economical to do so. Two Missouri utilities, Aquila

[12] "Job Jolt: The Economic Impacts of Repowering the Midwest: The Clean Energy Development Plan for the Heartland, An Economic Study by the Regional Economics Applications Laboratory for the Environmental Law and Policy Center," November 2002.
[13] "Renewing Where We Live," Union of Concerned Scientists, 2002.
[14] "Plugging in Renewable Energy: Grading the States," Union of Concerned Scientists, May 2003
[15] U.S. Department of Energy National Renewable Energy Laboratory National Wind Technology Center. The federal production tax credit for renewable energy is 1.5 cents/kWh.

(formerly UtiliCorp United Inc.) and City Utilities of Springfield invest in wind generation as part of their generating mix.

Due to the substantial progress over the past 20 years in improving the cost-effectiveness of wind turbines, it is now possible to profitably operate wind farms on areas with a wind resource that 10 years ago was considered sub-marginal for utility-scale wind development. The Department of Natural Resources is working with the U.S. Department of Energy to develop a high-resolution, modern assessment of Missouri's wind resources. To assist Missourians interested in assessing their wind resources for small-scale wind turbines, wind-measuring devices are available for loan from the Department of Natural Resources.

Missouri has an average daily summer solar radiation comparable to the vast majority of the United States including the state of Florida, making solar energy in Missouri an untapped opportunity. As the cost of traditional fossil fuels increases and the cost of solar energy declines, solar energy for electrical power generation and water heating is becoming more cost-effective as a means to help meet peak electrical demand.

As an agriculturally productive state, Missouri also has substantial land area available for energy crops and crop waste that can be used for bioenergy production. If one-half of the energy content of these available biomass resources were used in technology that is as efficient as the average American electric generation plant, the net energy produced would be 15.2 million megawatt hours (MWh). This assumes that biomass fuel can be economically transported to plants capable of burning such fuel. This compares to 76.6 million MWh generated in Missouri in 2000, or 20% of our current generation. However, at this time, only a few units in Missouri can effectively burn biomass fuel.

A co-op in Iowa is testing the use of dedicated energy crops. In the Chariton Valley, farmers have planted 5,500 acres with switchgrass to be burned with coal in a large power plant. If successful, the project will scale up to 50,000 acres, producing 200,000 tons of switchgrass each year and supplying 5% of the plant's fuel.

Northwest Missouri State University in Maryville, Missouri, exemplifies a successful bioenergy project. The university's alternative energy project began in 1979 using chipped wood waste. In 1990, it expanded to include combustion of paper pellets reclaimed from un-recyclable and unsoiled paper waste products from the five-county regional landfill. In 1994, they began the third phase of using animal waste. The university produces 85 to 90 percent of its campus heating and cooling needs through the use of these biomass energy sources. Since 1979, the university has saved more than $4 million in fuel costs, which is used for other operational costs.

In recent years Missouri has been active in the development and use of renewable transportation fuels – ethanol and biodiesel. In 2002, more than 40 million gallons of ethanol were produced in Missouri by two farmer-owned plants. Corn farmers in other

areas of the state are currently studying ethanol plant feasibility, and this is a rapidly changing situation.

The two ethanol plants in north Missouri have added significant direct economic benefits to Missouri, with the Macon plant adding almost $14 million and the Craig plant adding slightly over $10 million in 2001. The direct benefits of the two corn-processing ethanol plants to the north Missouri economy accrued to 1) the more than 600 members of the two new -generation cooperatives that own and operate the two plants; 2) most of the other corn farmers in north Missouri; 3) the local businesses in north Missouri that supply products and services to the ethanol plants; and 4) the state in terms of tax collections.[16]

Operating the two ethanol plants in northern Missouri, with each producing 22 million gallons of ethanol annually, is projected to result in increased total economic activity of almost $173 million throughout the rural Missouri economy annually. The direct and indirect impacts of the two plants, each producing 22 million gallons of ethanol annually, have the following major positive impacts on the north Missouri economies:

- Added value to almost 16 million bushels of corn annually,
- Created 1,815 jobs,
- Increased income to labor by $31.3 million,
- Increased total value added of $55.4 million,
- Increased total state output of $172.8 million, and
- Increased tax revenues of $17.7 million.

Biodiesel demand in the past 12 months was 700,000 gallons -- three times that of the prior year. Most of the recent growth is from farmers using biodiesel in their farming operations. Depending on federal energy policy and tax incentives, potential exists for a 15-20 million-gallon production facility in Missouri.

Recommendations

Aggressively develop, produce and use Missouri renewable energy and energy-efficiency resources to achieve the public benefits of economic growth, environmental quality and public health.

Establish a Public Benefits Fund to provide support to programs that protect low-income Missourians, promote energy efficiency, provide energy education and assist in the development and use of Missouri's renewable energy resources.

[16] Employment and Economic Benefits of Ethanol Production in Missouri, Donald L. Van Dyne, LLC& Research Associate, Professor Retired, Department of Agricultural Economics; University of Missouri, Columbia, MO, February 2002

Establish policies including financial and other incentives to encourage investments in energy efficiency and renewable energy development, production and use.

Encourage all Missouri utilities to aggressively seek collaborations and partnerships to develop new and/or expand present facilities to substitute renewable energy sources in place of imported fossil fuels for electric generation. In many cases for example, cities manage both electric generation and waste (biomass) disposal systems. With the passage of Amendment 4 in 2002, municipal utilities have greater flexibility in developing joint projects with other political subdivisions.

Pursue any shortfalls in peak electricity capacity through a variety of solutions:

- **building or contracting for additional conventional generating capacity;**
- **moderating the growth in peak demand through energy-efficiency or load-management programs;**
- **providing additional energy through renewable and distributed energy resources; or**
- **a combination of all of the above.**

Consider the effect of energy efficiency programs and renewable energy and non-renewable energy electricity generation upon utility bills, environmental quality and public health.

Encourage Missourians to use renewable transportation fuels such as ethanol and biodiesel.

Missouri State Government as a Leader in Energy Efficiency

Missouri state agencies (departments, commissions, authorities, offices, colleges or universities of this state) own and operate approximately 12,000 motor vehicles. In addition, state agencies own approximately 62.5 million square feet of building space and lease an additional 4.3 million square feet. Annually, state agencies expend about $11 million for motor vehicle fuel and about $78 million for energy use in state facilities. Energy efficiency saves taxpayer dollars that can be used to fund essential public services. If the state's energy bill is reduced just 10 percent (a conservative estimate), savings would be $7.8 million annually over the life of the efficiency measure. These dollar savings can play a critical role in funding public services under the current budget situation.

State success in improving the energy efficiency of its own facilities and fleet will lower state government's energy bill. In recognition of the potential benefits to the state,

Missouri enacted statutes establishing the State Fleet Efficiency and Alternative Fuels Program in 1991 and the Energy Efficiency in State Facilities Program in 1993.[17]

More importantly, success can be leveraged to influence, inform and motivate Missouri businesses and citizens toward greater energy efficiency. As the 2001 Missouri Energy Policy Task Force report states, the state should "lead the way to a comprehensive energy policy by setting the example."

The following recommendations for state government comprise an initial set of Council recommendations. The Council will evaluate additional recommendations in its future work.[18]

State Facility Management

The following discussion presents recommendations related to energy-efficient building construction and renovation, effective management of facility and equipment energy use, and procurement of energy-efficient equipment.

Properly implemented and well-maintained energy projects in state facilities typically return from 10 percent to 50 percent or more in avoided costs or cost savings over the life of the project. The Energy Policy Task Force concluded that comprehensive implementation of energy retrofit projects with a five-year payback would result in savings "exceeding several million dollars per year" and that significantly larger savings could be achieved if implementation were extended to meritorious retrofit projects with a longer payback period.

The state has audited approximately five percent of state structures. These audits identified energy-efficiency measures exceeding $7.5 million that could achieve annual savings of more than $1.3 million. Approximately 20 percent of the dollar value of these projects have been implemented, and savings are now being achieved. However, few audits or projects have occurred in recent years. As the Task Force report concludes, the state can and should do better. The Task Force recommends that all state buildings be analyzed for energy efficiency by fiscal year 2008.

Recommendation:

Increase the effectiveness of energy efficiency in state facilities by implementing "performance contracting" and allowing state agencies to retain a portion of energy savings.

[17] See Appendix B for the citations and a summary of the statutes related to these programs.

[18] Many of these recommendations are drawn from the final reports of the Missouri Energy Policy Task Force (Task Force report, 2001), the Missouri Energy Futures Coalition (Futures Coalition report, 1997) and the Missouri Statewide Energy Study (Energy Study report, 1992).

Energy Performance Savings Contracts (ESPCs) are frequently used by school districts and universities in Missouri and by state agencies in several other states. Their experience indicates that ESPCs are often a cost-effective method to realize potential energy savings. Large office buildings offer particularly good opportunities for cost savings. In Missouri, performance contracting has been used for energy projects on several state university campuses, but has not been used by state agencies.

The Missouri General Assembly passed bills in 2002 (SB810 and SB1012) that removed barriers to the use of ESPCs, and the Office of Administration is currently determining how best to implement these measures.

State agencies that achieve savings from energy efficiency measures should retain a portion of those savings to advance their mission. Both the Missouri State Energy Study and Governor's Energy Policy Task Force made this recommendation. This will require a change in the treatment of savings to allow the agency that initiated the energy-efficiency improvement to retain a portion of the savings for other agency needs. One innovative approach would be to allow state agencies to self-finance the cost-saving measures and repay the "conditional lease" through self-managed realized savings. Currently, state agencies may be reluctant to invest time and funds to develop capital-improvement requests for energy-efficiency projects because such requests tend to fare poorly competing with many other priorities facing the agencies.

Increasing the visibility of this effort among state agencies could also encourage participation. Governor Holden has directed the Energy Policy Council to publish an annual Green Progress Report, as recommended by the Task Force. The progress report is to assess how Missouri's public and private sectors are reducing their energy use and increasing their use of domestic renewable energy sources. This report could show state government's energy-conservation efforts and the resulting savings. In addition, the governor may choose to institute a governor's award to recognize agency achievement in energy efficiency and use of renewable energy in state facilities. This would complement governor's award programs directed outside state government, such as the existing Environmental Excellence and Pollution Prevention Awards or the annual Energy Efficiency and Renewable Energy Award proposed by the Task Force.

Recommendation:

Increase effectiveness of energy efficiency in state facilities by offering training to architects and engineers involved in designing state facilities and encouraging higher standards.

State law requires state-owned residential buildings that are at least three stories high to conform to ASHRAE/IESNA 90.1-1999 standards. Other ASHRAE and CABO standards are identified for state-owned buildings less than three stories. Revisions of these standards are automatically adopted by reference.

Training for ASHRAE 90.1 could be broken down by discipline, such as architectural, mechanical, and electrical disciplines. The state could also offer or facilitate training for

architects and engineers on advanced standards such as the Leadership in Energy and Environmental Design (LEED) Green Building Rating System™.

The LEED rating system addresses performance areas including selection of sustainable tenant space, efficiency of water use, energy performance optimization including lighting and lighting controls, resource utilization for interior building systems and furnishings, and indoor environmental quality including comprehensive emissions criteria. When incorporated in the planning and design of a building, established green building technologies can be built in at no additional cost.

The use of life-cycle costing methodology in the design or retrofit of energy systems and buildings is mandated in 10 CSR 140-7 and is endorsed in both the Energy Futures Coalition report and the Governor's Energy Policy Task Force report. Because the Office of Administration's Division of Design and Construction relies on consultants for design analyses, effective implementation of life-cycle costing requires that these consultants understand and adhere to clear guidelines for life-cycle analysis.

When cost-effective and appropriate, energy projects should exceed ASHRAE 90.1 and strive to achieve a LEED rating to maximize energy savings. The Task Force report recommends that the statutes related to energy efficiency in state facilities be amended as follows:

- Major new projects should exceed ASHRAE 90.1 standards where feasible, and
- Section 8.835 should be expanded to direct implementation of all energy projects with a simple energy savings payback period of 15 years or less.

The state could also encourage design professionals and local jurisdictions to adopt the International Energy Conservation Code (IECC) as the non-mandatory energy building standard. This effort could serve as a reference point for voluntary compliance, energy-efficiency ratings and efficiency incentive programs. The IECC was endorsed in 1999 by the Governor's Commission for the Review and Formulation of Building Code Implementation.

Recommendation:

Agencies should inform and train staff to design, implement and oversee energy-efficiency strategies and to purchase energy-efficient equipment.

Effective operation of energy systems and occupant behavior in state buildings extend the benefits of investing in efficient buildings and equipment by further reducing energy bills and extending the useful life of state investments.

The Task Force report provides specific recommendations for appointment and performance evaluation of energy-efficiency officers in various state agencies. The programs overseen by these officers should include not only compliance with state law

but also other equipment procurement and energy-management initiatives discussed below.

Clearly assign responsibility for achieving energy-efficiency gains throughout the state. The Energy Study recommended that energy management should be brought into focus. A key aspect of energy management is energy accounting, monitoring and control. Effective communication and sharing of information between energy officers in the various state agencies comprise important components of achieving this goal. If all agencies use the same methods for energy accounting in facility management, data from the agencies could be integrated into a periodic, comprehensive assessment of state energy use and expenditures.

Steps to reduce energy use could range from simple e-mail reminders to employees to turn off lights and equipment to training for users of specific types of equipment. During the past few years, a number of states faced with energy shortfalls have undertaken emergency energy-conservation campaigns. The state could draw on this example to develop a campaign on an ongoing rather than emergency basis and could leverage efforts by collaborating with other public and private sector institutions.

In January of this year, the Office of Administration implemented a number of no-cost energy-efficiency changes in 26 state buildings. These operational changes included items such as reducing the temperature on hot-water heaters, turning off ventilation fans during hours when buildings are unoccupied, reducing lighting where appropriate, and ensuring that economizers operated properly on heating and air conditioning equipment. Since January, the state has saved more than $100,000 in energy costs and reduced energy use by more than 1 million kWh.

Programs to train state facilities maintenance personnel in the efficient operation of equipment could include training on the operation of the heating, ventilation and air conditioning (HVAC) equipment by representatives from industry or state technical college instructors. Training for electricians could focus on topics such as how to identify bad electrical connections, test transformers, and set up load-shedding programs to reduce demand during peak energy use periods.

For many categories of energy-using equipment and appliances, energy savings can be achieved by purchasing advanced products that are commercially available.

The federal government establishes minimum energy standards that all manufacturers must meet. However, there are significant limitations. First, federal standards fail to cover many energy-intensive products. Second, the federal standards for minimum energy efficiency typically lag well behind the energy efficiency available from advanced products that are readily available on the market.

Recognizing this lag, several organizations have developed systems to help consumers identify and compare advanced products. Most familiar is the ENERGY STAR® label, which is a voluntary labeling program sponsored by the U.S. Department of Energy

(DOE) and the U.S. Environmental Protection Agency (EPA). The ENERGY STAR® label helps businesses and consumers easily identify highly efficient products, homes, and buildings that save energy and money, while protecting the environment. Other organizations that have developed broadly recognized standards for advanced products include the Consortium for Energy Efficiency (CEE) and the Federal Energy Management Program (FEMP).

The Energy Futures Coalition report endorsed these voluntary efficiency-labeling programs and recommended that the state support their use. Setting advanced efficiency standards for the procurement of energy-using equipment allows further energy savings and allows the state to leverage its experience to encourage private-sector companies and institutions to follow the state's example.

State Fleet Management

Missouri's State Fleet Efficiency and Alternative Fuels Program requires state agencies to plan and achieve specific goals for fuel efficiency and alternative-fuel use. The recommendations presented here focus on the energy-efficiency aspects of this program. However, the program also forms the cornerstone of state efforts to promote use of alternative fuels and alternative-fuel vehicles in the state fleet.

The program requires state agencies to acquire and maintain fuel-efficient vehicle fleets, promote efficient trip planning and state vehicle use, and reduce single-occupant vehicle (SOV) trips by state employees through strategies such as carpooling and vanpooling. The program also requires state agencies to report fleet data such as vehicle numbers, vehicle miles traveled, fuel use, fuel expenditures and maintenance cost. This data is compiled by the Energy Center in an annual report to the governor and General Assembly.

The greatest opportunity to improve the overall fuel efficiency of agency fleets is through procurement, when older and less fuel-efficient vehicles are replaced. Each state agency should meet the legal requirement that overall fleet fuel efficiency meet or exceed the fuel efficiency that would be achieved if each vehicle in the agency's fleet met federal Corporate Average Fuel Economy (CAFÉ) standards. State agencies should be encouraged to purchase only vehicles that meet CAFÉ standards and to increase the proportion of highly fuel-efficient vehicles purchased.

Recommendation:

Achieve the statutory fuel-efficiency goal through procurement, effective vehicle maintenance procedures, fleet management and telecommuting. State agencies should report progress in their annual budget requests.

The Task Force report recommends that the governor require each agency to report on its compliance and its plans to reach the program goals in annual agency budget proposals. Because the annual budget process provides a highly visible forum for

planning and monitoring progress on state-agency goals, objectives and priorities, this requirement would elevate the priority of achieving fleet-fuel efficiency.

State agencies should institute a formal maintenance program to maintain maximum fuel-efficiency ratings of all fleet vehicles, including routine assessments of tire pressure and wear on all vehicles.

State agencies are required by law to develop fleet energy-conservation plans that include procedures to promote efficient trip planning, efficient state vehicle use, carpooling and vanpooling. These plans should include provisions to accomplish the following:

- assign smaller and more fuel-efficient vehicles first if travel needs can be met with a smaller vehicle;
- develop energy-efficient routes and schedules for routine trips; and
- maximize alternative fuel usage in alternative fuel vehicles (AFVs). For example, agencies should base alternative-fuel vehicles at agency locations that are closest to refueling locations selling the alternative fuel used.

The Office of Administration fleet manager is currently working to develop a uniform tracking system for all state agencies. This system should promote efficient trip planning.

Another effective fuel-efficiency measure is telecommuting. State agencies should expand the use of telecommunications systems to decentralize work and reduce the need for travel to meetings, conferences and other offices and consider options such as e-mails, facsimile, and teleconferencing to reduce the need for travel.

Demonstration Projects

Recommendation:

Leverage state government successes by developing demonstration projects to influence, inform and motivate Missouri businesses and citizens toward greater energy efficiency.

For example, the Missouri Department of Natural Resources has begun construction of a new office building in Jefferson City that incorporates passive solar energy design; correct sizing and use of energy-efficient heating and cooling systems and appliances; and design of lighting systems, light shelves and glare-free thermal glass to provide daylighting, minimize heat gain and maximize ventilation and shading.

Similar demonstration opportunities exist or could be created in other state facilities. For example, the Kansas City Discovery Center, a joint venture between the Department of Conservation and the Department of Natural Resources, shares many design elements listed above. The Energy Study report recommends that the state incorporate displays of efficient lighting systems into public areas of state buildings.

The state could also use ENERGY STAR® program resources to promote building energy efficiency among other public institutions in the state.

The Department of Natural Resources earned state government's first ENERGY STAR ® label for its 41,500-square-foot state office building at 1659 East Elm Street. The energy-efficiency improvements cut energy costs in half and saves the state an estimated $55,000 annually. The award recognizes the 24-year-old building as being within the top 25 percent among buildings nationwide in terms of energy performance and indoor environment. The building's efficiency rating of 89, which places it in the top 11 percent of similar buildings in Jefferson City's climate zone, actually surpasses the ENERGY STAR threshold. Improvements included installation of a ground-source heat pump; other components of a higher efficiency heating, ventilation and air conditioning system; high-efficiency light fixtures; motion sensor controls; and high-efficiency office equipment. The energy savings from the upgrades are expected to pay for themselves in 11 years. The changes also will eliminate more than 3 million pounds of carbon dioxide, sulfur dioxide and oxides of nitrogen emissions through decreased electricity demands.

Standard Market Design: A Summary of Intent, Issues and Major Policy Direction

On July 31, 2002, the Federal Energy Regulatory Commission (FERC) issued its Notice of Proposed Rulemaking (NOPR) for Standard Market Design (SMD). The following discussion explains FERC's primary stated purposes for proposing these significant modifications in the operation and oversight of the nation's wholesale electricity markets. This background paper also reflects recent FERC policy changes issued April 28, 2003, in a special white paper intended to further clarify FERC's intent regarding SMD and to address concerns expressed by some states.

Intended Purposes for the Standard Market Design

- **Further Eliminate Undue Discrimination in the Provision of Transmission Service**

FERC's NOPR conveys the agency's stated intention to modify its existing transmission tariffs for the purpose of providing non-discriminatory open access to the transmission system for transacting electricity at wholesale. [19] Moreover, the purpose of the proposed rules is to restructure the wholesale markets for electricity, presumably to correct problems in the existing market structure. The NOPR focuses on utility companies as the source of the apparent discrimination. FERC characterizes these

[19] On April 24, 1996, the FERC established open access transmission in its Order Nos. 888 and 889. Open access transmission required all FERC jurisdiction utilities to offer transmission service, when available, on a first come, first served basis at FERC determined rates.

problems as both perceived and actual preference being given in the provision of transmission service by integrated utilities to their own generation. Thus, FERC believes the wholesale market has not provided open and adequate access to all parties. To correct this situation, all FERC jurisdictional utilities would be required to turn over the operation of their transmission systems to an Independent Transmission Provider (ITP).[20]

- **More Efficiently Allocate Scarce Transmission Capability and Increase Efficiency of Competitive Electricity Wholesale Markets**

In addition to preferences being given in the provision of transmission service, under the current market structure, the methods for managing congestion include (1) denying requests for firm transmission and (2) curtailing service on a proportional basis whenever a section of the transmission system becomes overloaded. Transaction curtailment without regard to economic value is an inefficient method of managing transmission congestion. The SMD proposes a system of centralized bidding in day-ahead and real-time electricity markets. The ITP would select the bids to equate supply with demand at least cost, subject to meeting the security constraints of the transmission system. This system of centralized dispatch is called locational marginal pricing (LMP), which theoretically provides an efficient mechanism for simultaneously allocating generation and transmission to end-use customers at the lowest cost. [21]

- **Provide Market-Based Price Signals for Investment in New Transmission**

Under the LMP form of pricing, transmission congestion costs reflect the electricity market's valuation of the loss in generation efficiency resulting from limited transmission capability. Since expansion of transmission capability through investment in upgrades to the transmission system will result in lower congestion costs, load-serving entities would determine when it would be less expensive to add new transmission capability as compared to continued payments of congestion costs under the proposed SMD market design.

Potential Undesirable Consequences from Standard Market Design

- **Increased Administrative Costs for Transmission.**

Because of the high cost for computer systems and personnel required to provide centralized day-ahead and real-time electricity markets, the SMD will significantly increase the costs for providing transmission service. In order to keep per customer costs as low as possible, large numbers of market participants will be required over

[20] The SMD NOPR sets out specific conditions for independence, but essentially, this entity must have no financial interest in the markets for electricity.

[21] LMP is currently being used in the northeast by the New England ISO (Independent System Operator), the New York ISO and the PJM (Pennsylvania, New Jersey and Maryland) ISO.

which to spread these higher costs, and the SMD NOPR therefore proposes that such markets be mandatory, not voluntary.

- **Promoting Regional Use of Transmission by Shifting Costs onto Regulated Utilities Providing Local Service and Putting Upward Pressure on Electric Rates.**

The SMD proposes access charges to be paid based on the electric power (load) delivered to customers. This eliminates usage charges for transmission, including the practice of charging transmission customers multiple rates for transactions that involve more than one utility's transmission system, which is often referred to as rate "pancaking." While this will reduce the costs for wheeling electricity through a regulated utility's transmission system, it will also mean less revenues to offset the cost of transmission to that utility's own customers. While the effect of this change will be a shift of transmission costs away from customers being served from more distant sources of generation, it will increase transmission costs for customers being served by a regulated utility from generation located within that utility's service territory. Because Missouri consumers are largely served from generation located within their utility's service territory, the proposed SMD will likely result in adverse electric rate impacts. A recent report from the U.S. Department of Energy projects that rate increases of 3 to 4 percent would occur in the MAIN (Mid-America Interconnected Network, Inc.) reliability council region (which includes eastern Missouri) as a result of a change to SMD.[22]

- **Create Greater Jurisdictional Tensions between State and Federal Regulation.**

In order to "eliminate undue discrimination" the FERC proposes that "the transmission component of bundled retail service must be taken under an open access transmission tariff."[23] This requirement would make mandatory the jurisdictional impact that occurs under Order 2000 when a utility is permitted to join an RTO. The FERC has proposed a couple of remedies in an attempt to compensate for the potential harm associated with this transfer of jurisdiction. First, the SMD proposes that the utilities serving bundled retail load be given financial transmission rights that would compensate them for congestion charges that would be applied under the new FERC open access tariff. It appears that there will not be sufficient financial transmission rights to cover all congestion charges and bundled retail load will be subject to the risk of having to pay some portion of these congestion charges. Second, the April 28, 2003, SMD White Paper has suggested that wholesale transmission contracts between the utility and the RTO include rates set at the level intended to recover the transmission costs of the utility's current retail bundled rate.

[22] "Report to Congress: Impacts of FERC Proposal for SMD" U.S. Department of Energy, April 30, 2003.
[23] SMD NOPR at ¶ 118. Bundled retail load is the term used to describe the retail customers currently being served by utilities under state regulation where there is no retail competition. In Missouri there is no retail competition. Open access tariff is the term used to describe the FERC approved tariff charges for access, congestion charges and transmission losses.

These changes from state to federal jurisdiction will expose bundled retail customers to financial risks based on potentially volatile market prices rather than the limited exposure to costs of generation redispatch that regulated utilities face today in addressing congestion. These proposed changes in jurisdictional treatment for bundled retail load have resulted in strong reactions from state regulatory commissions that see no upside benefits from taking on these added downside risks.

Major Policy Recommendations:

The Utility's Bundled Retail Customers Should Not Be Exposed to Congestion Charges for Retail Use of the Utility's Transmission System by Placing Them under FERC Jurisdiction.

Missouri consumers should not be adversely affected. Electricity from the utility owned-and-operated generation plants to meet the load of bundled retail customers should be scheduled on its own transmission system without exposure to financial congestion charges. Such transactions should have priority on the transmission system. Historically, "native load" or bundled retail customers have paid for, and continue to pay for, existing transmission systems that utilities built to move electricity from local generation facilities to these native load customers throughout the utility company's service territory. It is poor public policy to charge the utility's bundled retail customers for transmission congestion costs that result from demands by wholesale transactions associated with wheeling power through or exporting power out of the utility's transmission system.

Transmission Upgrades for Reliability Purposes Should Be Funded by those Sub-Regions Requiring Reliability Improvements, and Transmission Upgrades for Commercial Purposes Should Be Funded by Participants that Benefit from the Added Transmission Capacity.

If upgrades to the transmission system are needed for purposes of system reliability, a determination should be made as to which sub-regions within the larger transmission system are inadequate with respect to transmission, and the costs of the upgrades should be assigned to those sub-regions. In Order No. 2000, the FERC stated that Regional Transmission Organizations (RTOs) should have sufficient geographic scope to cover significant market areas. For the Midwest, this RTO will likely include a region as far north a Manitoba and as far south as Kentucky. When the RTO region is this large, decisions regarding transmission in one sub-region may have little or no impact on other sub-regions within the RTO. Rolling in the cost of transmission upgrades to the entire RTO region when those upgrades are required to enhance the reliability of a sub-region is poor public policy and is likely to result in disputes among sub-regions.

In addition to upgrades needed for system reliability, upgrades to transmission can improve the commercial viability for various market participants. These decisions involve the trade-off between locating a generation plant close to the load versus building transmission to import the electricity from a distant generation location to meet

that same load. In those instances where the decision is made to upgrade the transmission capacity rather than to build local generation, those that benefit from the transmission upgrade should fund its cost.

Minimum Resource Adequacy Requirements for Reliability Should Be Determined by Regional Reliability Organizations, and Any Additional Resource Requirements for Bundled Retail Load Should Be Determined by Individual State Regulatory Commissions and for Wholesale Load Should Be Determined by the FERC.

Resource-adequacy requirements are needed to ensure the reliability of a power system. The reliability of a power grid is a statistical determination involving both loss of load probability[24] and contingency conditions[25] on the power grid, and is not an economic determination, such as meeting load at a minimum cost. Regional Reliability Organizations (RROs) have set these criteria in the past and should continue to set them in the future.

In addition to attempting to address reliability considerations, the SMD's higher resource adequacy standards are intended to mitigate price spikes in the wholesale electricity markets like those that occurred two years ago in California. Where retail load rates remain regulated at the state level, such a determination should remain with the state regulatory commissions. At the same time, where there are municipal utilities that purchase electricity from competitive wholesale markets, the FERC has jurisdiction, and the FERC should make the determination concerning resource adequacy for those load-serving entities that are subject to its jurisdiction.

[24] Loss of load probability takes into account the probability of generation unit outages occurring along with the probability of loads occurring from various weather conditions. The criterion is determined as an upper limit on the probability of having insufficient generation to meet load. The various Regional Reliability Organizations have set these limits.

[25] Contingency conditions look at worse possible situations where either key power lines or generation plants are forced out of service. A reliable power system is one where under contingency conditions, the power grid will not cascade out of service from rolling black outs.

Appendix A

Projected Peak Electricity Demand and Supply for Missouri

(Megawatts)

	2003	2004	2005	2006
Capacity Available	22,986	23,151	22,161	22,137
Capacity Required	22,014	22,351	22,755	23,333
Excess/Shortage	972	800	(594)	(1,196)
Investor-owned				
Available	16,775	16,925	16,054	16,020
Required	16,310	16,526	16,805	17,252
Excess/Shortage	465	399	(751)	(1,232)
Coop and Municipal				
Available	6,211	6,226	6,107	6,117
Required	5,704	5,825	5,950	6,080
Excess/Shortage	507	401	157	37

- At present, the combined capacity of these nine utilities exceeds their combined required capacity (which includes a required reserve margin) by about four percent, a surplus of about 970 megawatts (MW).[26] However 2006 project capacity requirements for these utilities projected to exceed combined projected capacity by about 4 percent, a deficit of about 1,200 MW. However, in the normal course of business, investor-owned utilities work with the PSC to plan for future energy needs. Therefore, the projected 2006 capacity shortfall is not expected to be a critical issue because plans have begun to ensure sufficient generation.

- A shortfall in peak capacity could be addressed through a variety of solutions: building or contracting for additional conventional generating capacity, moderating the growth in peak demand through energy-efficiency programs or load-management services, providing additional energy through renewable and distributed energy resources or a combination of all three. In addition, as a result of overbuilding of capacity by unregulated wholesale generators in the Midwest, there may currently be excess capacity available on the wholesale market at reasonable terms.

- This data is based on the aggregate four-year projected peak demand and capacity for nine of the largest electric utilities in the state. These include the five investor-owned utilities; Associated Electric Cooperative Inc. (AECI), the primary source of power for 51 electric distribution cooperatives; and the state's three largest municipal electric utilities (Springfield City Utilities, Independence Power and Light and

[26] The capacity requirement includes a 12 to 16 percent reserve margin above the utilities' forecasted peak demands, determined by the power pool to which the utility belongs.

Columbia Water and Light). Data for AECI and the three municipal utilities was provided by the individual utilities; the Public Service Commission provided data for the investor-owned utilities.

- For purpose of this analysis, the data is aggregated assuming that the peak demand for these different utilities coincides in time. In reality, peak demand for different systems does not necessarily occur on the same day of the summer. However, the data that would be required to analyze peak demand and capacity in finer time gradations is not available.
- The data that is provided is estimated on a system-wide basis and includes both Missouri and non-Missouri resources and customers for the utilities that operate in more than one state. This includes three of the investor-owned utilities (AmerenUE, Empire and KCPL) as well as AECI, which serves several electric distribution cooperatives in southern Iowa and northeast Oklahoma.
- Utility projections of peak demand rely on models that take economic variables into account and therefore are subject to the uncertainty inherent in economic forecasting.

Appendix B

State Government Facility and Fleet Efficiency Statutes

Energy Efficiency in State Facilities
State law passed in 1993 (RSMo 8.800-8.851)
Rule (10 CSR 140-7.010 – State Building Minimum Energy Efficiency Standards; effective February 25, 1996).

This statute was established to increase the energy efficiency of state and other public buildings. Specific provisions include:

- Minimum energy efficiency standards to be established for the construction of state buildings or major building renovations;
- Department of Natural Resources is to make energy efficiency practices information available to persons involved in the design, construction, retrofitting and maintenance of public buildings and state buildings;
- Energy efficiency is to be evaluated when buildings are considered for acquisition by the state;
- Office of Administration/Division of Design and Construction, in conjunction with Department of Natural Resources, is to compile data on energy consumption and energy costs for all state buildings to establish a baseline for energy consumption;
- Department of Natural Resources is to analyze all state buildings for energy efficiency, as funds become available;
- The Division of Design and Construction is to recommend energy efficiency projects;
- Department of Natural Resources is to establish a state building energy efficiency rating system; and
- Creates an Interagency Advisory Committee on Energy Cost Reduction and Savings.

State Fleet Energy Efficiency and Alternative Fuels
State law passed in 1991 (RSMo 414.400-414.417, revised 1998)

This statute was established to implement federal requirements to reduce fuel consumption and include alternative fuel vehicles in the state fleet. Specific provisions include:

- Department of Natural Resources, in consultation with the Office of Administration, is to develop and implement a state vehicle fleet program to reduce fuel consumption, improve fleet management and promote the use of alternative fuels;

- Each state agency is to develop and implement a plan for the purposes of reducing vehicle fuel consumption;

- Department of Natural Resources is to develop a motor vehicle alternative fuel use plan and recommend alternative fuels which state agencies and state universities may consider when purchasing vehicles;

- Any state agency that operates a fleet of more than 15 vehicles must acquire alternative fuel vehicles. The 1998 amendments specify that at least 50 percent of the non-exempt state vehicles purchased after July 1, 1998 be capable of operating on alternative fuels.

- The 1998 amendments revise the cap on incremental life-cycle costs of alternatively-fueled vehicles from the previous limit of 5 percent to 10 percent over that of traditionally fueled vehicles. In air pollution non-attainment areas the incremental cost cap is up to 17 percent higher.

Appendix C

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